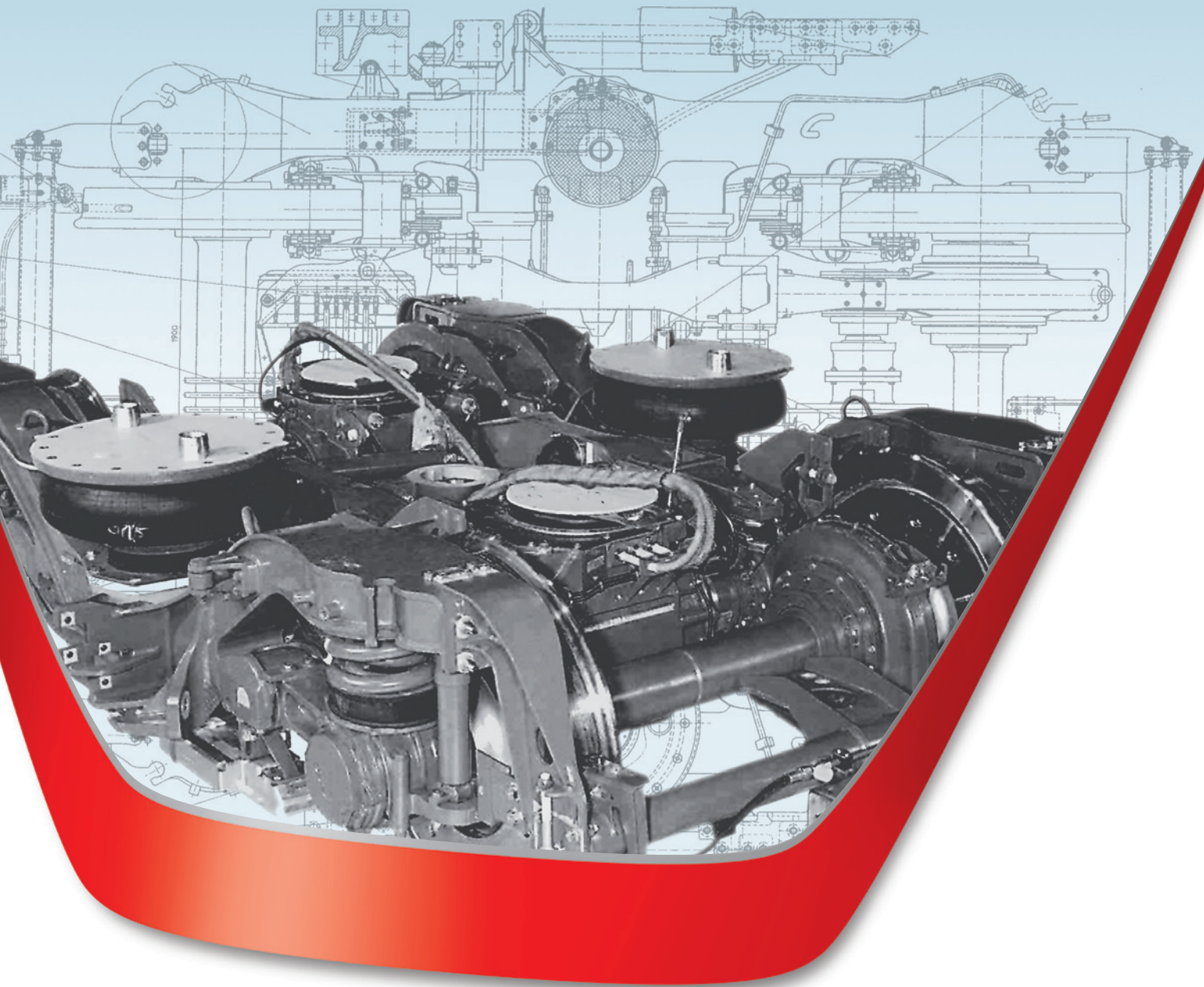


FLEXX Bogies

At the Forefront of High Speed Expertise



Bogies

BOMBARDIER

◁ At the Forefront of High Speed Bogie Expertise ▷



For decades, Bombardier has been at the leading edge of high speed developments, starting with its first bogies in operation at 200 km/h in the 1960's. Since the 1980's, Bombardier has delivered more than 10,000 FLEXX Speed bogies in Central and Northern Europe, North America and China, of which 3,500 are operating at speeds in excess of 250 km/h.

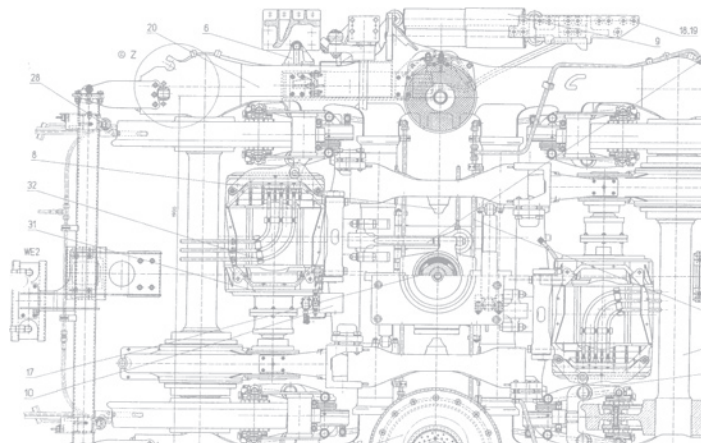
With major distances travelled and long journey times, comfort and superior ride quality are essential prerequisites for high speed trains that Bombardier addresses with high performance suspension systems. Our *FLEXX* Speed bogies ensure safe and stable running throughout the entire application's speed range.

In addition, due to the demanding running performance of highspeed rail vehicles, maintenance and energy have a great impact on the total life cost. Compared with operation at 140 km/h, kinetic energy at 200 km/h is twice as high and at 300 km/h it can even be 4 times greater. This is addressed by bogie design parameters such as minimal bogie weight and unsuspended mass as well as specific features, e.g. condition monitoring.

FLEXX Speed

Bombardier has been designing *FLEXX* Speed bogies for several generations of *ICE*** trains, as well as for the X2000 tilting trains, which are operating in Sweden and China at speeds of 200 km/h. Bombardier developed and manufactured all bogies for the *ICE1*** and (in consortium with Siemens) was jointly responsible for the development of the *ICE3*** bogies in Germany. More than 2,800 *FLEXX* Speed bogies are currently running under the *ICE* fleet.

FLEXX Speed Bogies have proved their reliability and efficiency since their first introduction in 1998. They are characterised by excellent ride quality at very high speeds up to 330 km/h.





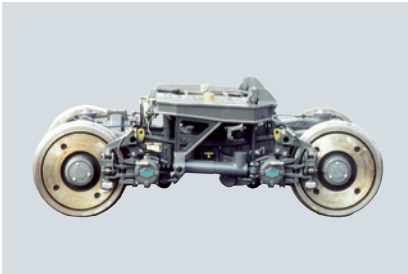
Meridian, regional DMU
for Midland Mainline, United Kingdom



AVE S-102**, Spain



ICE 3, Germany



During German track tests in 2002
"TR400" FLEXX Eco prototype bogies
reached 392 km/h



FLEXX Power 350 bogie



FLEXX Speed bogie

FLEXX Eco

The *FLEXX Eco* bogie family is characterised by inner bearings and an extremely compact and low weight design: 30% reduction in bogie weight and unsprung mass compared with conventional bogies.

In addition, the *FLEXX Eco* bogie enables significant reductions in energy consumption and noise emission. With almost 1,000 units in operation worldwide, the reliability and operational benefits of the *FLEXX Eco* bogie have already been proven. Its excellent stability makes it ideally suited for high speed applications: the *FLEXX Eco* bogie was successfully tested in Germany and in Japan (under a Shinkansen train) at speeds up to 392 km/h.

FLEXX Power 350

High Speed locomotive bogies for power heads need to resolve the paradox of high-power drives and lowest possible unsprung mass and axle load. Therefore, a sophisticated design and integration of motor and drive units within the bogie are the key for successful high speed operation.

FLEXX Link

FLEXX Link bogies are mounted under the *BOMBARDIER* REGINA** trains in Scandinavia and CRH1 trains in China. This high speed bogie family is characterised by a robust design, a good curving performance and capability of operating in extreme weather conditions.

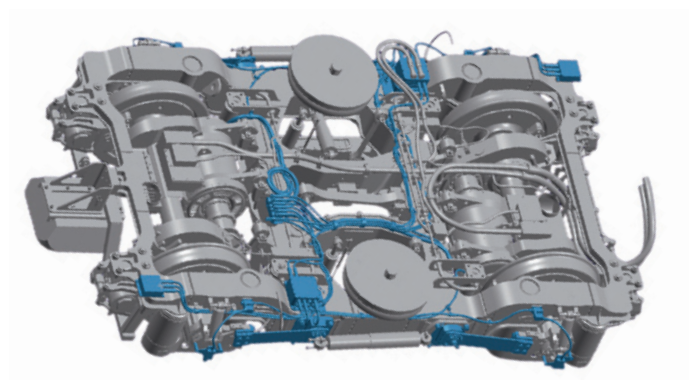
FLEXX Tronic

A *FLEXX Bogie* equipped with *FLEXX Tronic* technology was tested on a *REGINA* train in cooperation with Swedish partner Banverket within the „Green Train“ project.

In July 2007, tests were performed at speeds up to 282 km/h, setting a new Swedish speed record. The innovative *FLEXX Tronic* technology offers powerful features that can be applied individually or in combination:

- active radial steering
- stability control
- bogie condition monitoring (*FLEXX Guide*)
- track quality monitoring (*FLEXX Track*).

These features result in several advantages, including reduced track wear, weight and noise. Numerous applications, in particular high speed and tilting trains can benefit from this technology.



FLEXX Link Bogie equipped with FLEXX Tronic technology

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